

Battery Control with Moving Average Algorithm to Smoothen the Intermittent Output Power of Photovoltaic Solar Power Plants in Off-Grid Configuration

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Abstract : Solar energy is increasingly recognized as an important future energy source due to its abundant availability and renewable nature. However, the intermittent nature of solar energy can cause fluctuations in the electricity produced, making it difficult to guarantee a stable and reliable electricity supply. One solution that can be implemented is to use batteries in a photovoltaic solar power plant system with a Moving Average control algorithm, which can help smooth and reduce fluctuations in solar power output power. The parameter that can be adjusted in the Moving Average algorithm is the window size or the arithmetic average width of the photovoltaic output power over time. This research evaluates the effect of a change of window size parameter in the Moving Average algorithm on the resulting smoothed photovoltaic output power and the technical effects on batteries, i.e., power and energy usage. Based on the evaluation, it is found that the increase of window size parameter will slow down the response of photovoltaic output power to changes in irradiation and increase the smoothing quality of the intermittent photovoltaic output power. In addition, increasing the window size will reduce the maximum power received on the load side, and the amount of energy used by the battery during the power smoothing process will increase, which, in turn, increases the required battery capacity.

Keywords : battery, intermittent, moving average, photovoltaic, power smoothing

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